RMT®
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Environmental
Solutions

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October 23, 2001

Ms. Gwen Zervas
Case Manager
New Jersey Department of Environmental Protection (NJDEP)
Bureau of Federal Case Management
Division of Responsible Site Party Remediation
CN 028
Trenton, NJ 08625-0028

Subject: Responses to August 23, 2001 NJDEP Letter and Addendum for the *"Work Plan for Supplemental Investigation of Natural Attenuation of Dissolved Constituents in Groundwater"*, L.E. Carpenter Superfund Site, Wharton, Morris County

Dear Ms. Zervas:

On behalf of L.E. Carpenter & Company (LEC), RMT, Inc. (RMT) has prepared this response to the subject letter received by LEC on August 28, 2001 regarding your review of RMT's May 2001 Monitored Natural Attenuation (MNA) Work Plan. The following responses relate to each of the numbered comments in the August 23 letter:

1. **Comment:** *The work plan states that wells will be drilled using air-rotary techniques. For shallow wells such as these, EPA prefers hollow stem auger methods. If these have proved problematic in the past, then air rotary is acceptable.*

   Response: LEC will use hollow-stem auger or air rotary techniques.

2. **Comment:** *When surveying new wells, please include the ground surface elevation next to each well. The work plan also should mention that the wells would be located horizontally. It is assumed that this method is intended, but the text does not clearly state it.*

   Response: A survey of the newly installed wells will take place following the installation and completion of these wells. The survey will consist of locating the horizontal coordinates of the well in addition to the vertical elevation of the well measuring point. Additionally, the surveyor will measure the natural ground-surface elevation at each new well location. A New Jersey licensed professional surveyor will perform all survey work.

3. **Comment:** *Analyses for ethene and ethane are typically included to evaluate the breakdown of chlorinated solvents. Their utility here is unclear.*

   Response: We have removed ethene and ethane from the NA parameter list.

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4. **Comment:** *Natural attenuation parameters should be collected quarterly. This will allow for the evaluation of any trends, as well as possible seasonal variations.*

   Response: We will begin this MNA program by monitoring all of the natural attenuation parameters on a quarterly basis. The parameter list and monitoring well network will be evaluated after one year of sampling to determine whether a reduction in the number of parameters and monitoring wells are warranted.

5. **Comment:** *Ferrous iron concentrations typically change quickly after a sample is removed from the subsurface. These analyses should be conducted in the field using a test kit.*

   Response: RMT will measure ferrous iron in the field using colorimetric method #8146 using a Hach portable colorimeter or equivalent.

6. **Comment:** *Turbidity should be added to the list of field parameters to be measured during sampling events. This provides an additional check on field parameter stability and aids in documenting that a well is properly developed/not damaged at the time of sample collection.*

   Response: As stated on pages 2 and 20 and Table 2 of the Quality Assurance Project Plan (QAPP), RMT will measure turbidity from each well sampled for NA parameters on a quarterly basis. We will use a site calibrated field portable turbidimeter and report the value in Nephelometric Turbidity Units (NTU).

7. **Comment:** *Summary water levels should be collected across the site in conjunction with the sampling events.*

   Response: Depth to water measurements were included in Table 2 of our May 2001 workplan. RMT will continue to collect water level measurements across the site during each sampling event. We will measure the water levels before the collection of any groundwater samples. We will measure all water levels as close a time interval as possible to minimize the effects of time dependent phenomenon such as barometric fluctuations.

8. **Comment:** *As stated in the text, preliminary inputs to the groundwater model should be discussed and agreed upon prior to initiating work on the model. Degradation rates will be very difficult to accurately define, leaving considerable uncertainty in the resulting natural attenuation time frames. Much of the value from the modeling will lie in runs that do not include a degradation term. If degradation is important, these runs should show that the plume has not migrated the distances expected without degradation. Please be sure to include this in documenting the results. Actual forward projections will be viewed only as estimates, the accuracy of which are qualified by the uncertainties of inputs.*

Response: Following completion of the first four quarterly MNA monitoring events, RMT will meet with EPA/DEP representatives to discuss and agree upon the preliminary inputs to the groundwater model before initiating work on the model. We agree that degradation rates will be difficult to define accurately. Therefore, we will perform a sufficient number of computer simulation runs including runs with and without a degradation term. We will calibrate degradation rates used in the model to site-specific contaminant concentrations observed along a well-defined flowpath. We will adequately document all simulation runs in the final report.

9. **Comment:** *The Department had commented that L.E. Carpenter did not incorporate the then latest sampling results of 1600 ppb DEHP in its screening model, but rather a value of 670 ppb. The Department believed that by using the higher number in the model, perhaps the model would predict that the natural attenuation of the dissolved plume is less likely or incomplete. L.E. Carpenter responded that the point of the figure is to indicate the spatial distribution of contamination. This response is unclear. The point of the Department's comment was to use the most representative values in the modeling effort, not to draw a correct map. Accordingly, in any future modeling efforts, L.E. Carpenter must employ the most conservative sampling results, given the uncertainties in the other input parameters.*

   Response: RMT will employ the most representative modeling parameter values in future modeling activities, including the highest (most conservative) observed concentration values for source terms, where appropriate. We will also perform sensitivity testing of the model to evaluate effects of various concentrations. It is important to note that our workplan calls for an expanded groundwater-monitoring network for sampling wells during future quarterly monitoring events (see attached Figure 2). We anticipate that data collected from the additional wells will allow input of more accurate parameters and a truer representation of existing conditions in the model.

10. **Comment:** *The document indicates that a three-dimensional model will be constructed to evaluate natural attenuation at the site. Please note that the applicable ASTM modeling standards must be followed in any modeling effort and in reporting the results.*

    Response: RMT will follow applicable ASTM modeling standards in our modeling effort and final report.

11. **Comment:** *L.E. Carpenter proposes to install two additional wells to complete plume delineation in the MW-14 area. The Department believes that the proposed well MW-28 is redundant to MW-14S and will serve no useful purpose.*

Response: RMT believes that the proposed wells are all necessary to evaluate the shallow groundwater flowpath and quality in this area in order to provide the data necessary to support the 3-dimensional model. The hydrogeology in the Wharton Enterprises area (near MW-22R) is important to quantify, because of the proximity of the two surface water bodies. Based on historical groundwater contour maps groundwater flow through the Wharton Enterprises property appears to vary significantly during different time periods. The proposed shallow well locations we show on the attached Figure 2 will allow an accurate simulation of existing conditions for the three-dimensional groundwater flow and contaminant fate and transport model.

12. **Comment:** *There appears to be no advantage in locating a well between MW-3 and MW-14S. Most likely contamination will be found at MW-27 comparable to MW-22R.*

    Response: It is difficult to predict off hand what the actual concentrations in any proposed well would be given seasonal groundwater table fluctuations and apparent flow direction variations in the Wharton Enterprises area. As we described above, the rationale for locating additional wells is to fill in data gaps regarding groundwater flow patterns. These data are necessary to develop and calibrate the simulation of existing conditions for the required computer model.

We believe that these responses adequately address your concerns. We have attached revised tables and a figure incorporating the above comments.

LEC would like to implement the MNA monitoring program beginning with the first quarter 2002 groundwater monitoring event. Therefore, we look forward to a timely response from DEP/EPA. Please contact Nick Clevett at (312) 575-0200 with any questions or comments.

Sincerely,

RMT, Inc.

MRC

Nicholas J. Clevett

Nicholas J. Clevett
Project Manager

James J. Dexter
Project Director

Attachments:

Workplan
Table 1. Data Quality Objectives and Well Selection Criteria
Table 2. Natural Attenuation Analysis Parameters

Quality Assurance Project Plan (QAPP)
Table 1. Field and Laboratory Analyte List
Table 2. Water sample Containers, Preservatives, and Holding Times
Table 3. Natural Attenuation and Remedial Design Analytical Methods
Table 4. Natural Attenuation and Remedial Design Analytical reporting Limits

Figures
Figure 2. Proposed Monitoring Well Locations and Groundwater / Natural Attenuation Sampling Locations.

cc: Cris Anderson – LEC
Eric Swanson – RMT, Grand Rapids
Drew Diefendorf – RMT, Ann Arbor
Central Files (2)

Work Plan
Tables 1 and 2

Table 1
Data Quality Objectives and Well Selection Criteria
L.E. Carpenter & Company MNA Workplan

FREE PRODUCT/DISSOLVED PLUME AEC (1)

Well	Objective.
MW-6R	Define source area COC and MNA parameter concentrations.
MW-2R	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
MW-3	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
MW-4	Quarterly groundwater monitoring well for defining COC.
MW-14S	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
MW-14I	Define COC and MNA parameter concentrations and vertical gradient relationships between shallow and intermediate groundwater zones.
MW-15S	Quarterly groundwater monitoring well (upgradient).
MW-15I	Quarterly groundwater monitoring well (upgradient) and evaluate vertical gradient.
WP-B6	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
WP-B7	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
MW-17S (2)	Establish baseline MNA parameter concentrations in an on-site shallow upgradient "Clean Zone".
MW-21	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
MW-25(R)	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
MW-22R	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
MW-27 (3)	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
MW-28 (3)	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
MW-29 (3)	Define COC and MNA parameter concentrations and shallow groundwater flow pattern relationships.
SW-1 & SW-2	Define COC in ditch surface-water samples.

COCs = Contaminants of Concern: benzene, toluene, ethylbenzene, xylenes, and bis (2-ethyl hexyl) phthalate (DEHP)
AEC = Area of Environmental Concern
MNA = Monitored Natural Attenuation

Note(s):

1. Many of the wells in the AEC's are proposed for comprehensive sampling for all parameters listed on Table 2 to establish baseline concentrations for one full year (four quarters) of sampling. Once baseline concentrations have been established, a reduced list of wells will be selected for long-term monitoring. Rationale for well selection for long-term monitoring will be provided to USEPA/NJDEP once established.
2. MW-17S is a background well that has consistently shown no detection for all COCs.
3. Data obtained from these wells will more clearly define shallow groundwater flow patterns influenced by the Rockaway River and the Air Products drainage ditch.
4. MW-19/Hot Spot 1 area of concern is located in the northwestern portion of the LEC site.

Table 1 (Cont.)
Data Quality Objectives and Well Selection Criteria
L.E. Carpenter & Company MNA Workplan

MW-19/HOTSPOT 1 AEC [(1)(4)]	
Well	**Objective**
MW-19	Establish baseline dissolved COC and MNA parameter concentrations in the MW19/HS1 former source area.
MW-19-1	Establish baseline dissolved COC and MNA parameter concentrations in the MW19/HS1 former source area.
MW-19-2	Establish baseline dissolved COC and MNA parameter concentrations cross-gradient of the MW19/HS1 former source area (leading western edge of the plume).
MW-19-5	Establish baseline downgradient dissolved COC and MNA parameter concentrations.
MW-19-6	Establish baseline downgradient dissolved COC and MNA parameter concentrations.
MW-19-7	Establish baseline downgradient dissolved COC and MNA parameter concentrations.
MW-19-8	Establish baseline downgradient dissolved COC and MNA parameter concentrations.
MW-19-9D	Establish baseline dissolved COC concentrations at Ross Street regional interceptor sewer line, and vertical gradient evaluation.

COCs = Contaminants of Concern: benzene, toluene, ethylbenzene, xylenes, and bis (2-ethyl hexyl) phthalate (DEHP)
AEC = Area of Environmental Concern
MNA = Monitored Natural Attenuation

Note(s):

5. Many of the wells in the AEC's are proposed for comprehensive sampling for all parameters listed on Table 2 to establish baseline concentrations for one full year (four quarters) of sampling. Once baseline concentrations have been established, a reduced list of wells will be selected for long-term monitoring. Rationale for well selection for long-term monitoring will be provided to USEPA/NJDEP once established.
6. MW-17S is a background well that has consistently shown no detection for all COCs.
7. Data obtained from these wells will more clearly define shallow groundwater flow patterns influenced by the Rockaway River and the Air Products drainage ditch.
8. MW-19/Hot Spot 1 area of concern is located in the northwestern portion of the LEC site.

Table 2
Natural Attenuation Analysis Parameters

FIELD PARAMETERS	METHOD/EQUIPMENT	FREQUENCY
Dissolved oxygen	360.1(2)/Probe	Quarterly
Redox potential	(4)Redox electrode	Quarterly
pH	150.1(2)/pH electrode	Quarterly
Temperature	From conductivity probe	Quarterly
Turbidity	Turbidimeter	Quarterly
Electrical conductivity	120.1(2)/Electrical conductivity meter	Quarterly
Ferrous iron	Hach kit; Method 8146	Quarterly
CO_2	Hach kit	Quarterly
Alkalinity (total)	Hach kit	Quarterly
Depth to water(5)	Electric tape	Quarterly
LABORATORY PARAMETERS	**METHOD**	**FREQUENCY**
Benzene	602(1)	Quarterly
Toluene	602(1)	Quarterly
Ethylbenzene	602(1)	Quarterly
Xylenes	602(1)	Quarterly
DEHP	625(1)	Quarterly
Nitrate	353.2(2)	Quarterly
Ferrous iron	Hach kit; Method 8146	Quarterly
Sulfate	375.4(2)	Quarterly
Heterotrophic bacteria plate count	9215B(4)	Quarterly
Methane	3810(3)	Quarterly
TSS	160.2	Quarterly
TDS	160.1	Quarterly
Phosphorus	365.2(2)	Quarterly
Total organic carbon (soil)	9060(3)	During well installation

Notes:
(1) Federal Register 40 CFR Part 136, Vol. 49, No. 209, Test Parameters for the Analysis of Pollutants.
(2) USEPA 600/4-79-020 Methods for Chemical Analysis of Water and Waste.
(3) SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, U.S. EPA, 3rd Edition, 1986.
(4) Standard Methods for the Examination of Water and Wastewater, 19th Edition, 1995.
(5) All site wells measured before sampling begins.

QAPP Plan
Tables 1 thru 4

Table 1
Field and Laboratory Analyte List

<table>
<tr><th>FIELD METHODOLOGIES</th><th colspan="2">ANALYTES</th></tr>
<tr><td>Purge Stability using a micro purge cell, probe and electrodes</td><td colspan="2">DO, Eh, pH, specific conductance, temperature, turbidity</td></tr>
<tr><td>Natural Attenuation criteria using a Hach field kit</td><td colspan="2">CO_2, alkalinity, ferrous iron</td></tr>
<tr><th>LABORATORY METHODOLOGIES</th><th colspan="2">ANALYTES</th></tr>
<tr><td rowspan="2">Contaminants of Concern</td><td rowspan="2">Organics</td><td>BTEX</td></tr>
<tr><td>DEHP</td></tr>
<tr><td rowspan="4">Natural Attenuation Criteria</td><td>Anions</td><td>Sulfate, nitrate</td></tr>
<tr><td>Cations</td><td>Ammonia, phosphorus</td></tr>
<tr><td>Other</td><td>Alkalinity, total organic carbon (soil only)</td></tr>
<tr><td>Breakdown gases</td><td>Methane, carbon dioxide</td></tr>
</table>

Table 2
Water Sample Containers, Preservatives, and Holding Times

PARAMETER	CONTAINER(S)*	MINIMUM SAMPLE VOLUME	FIELD PRESERVATION METHOD	HOLDING TIME(1)
Volatile organics	3 x 40 mL glass VOA vials with Teflon® (2) septum	1 x 40 mL VOA vial	Cool to 4°C, add HCl to pH < 2; protect from light	14 days (sample should remain on-site less than 24 hours)
Semivolatile organics (DEHP)	1 x 1,000 mL amber bottle(4)	1,000 mL	Cool to 4°C	7 days to extraction 40 days from extraction to analysis
Alkalinity	1 x 1,000 mL high-density polyethylene bottle (3)	1,000 mL	Cool to 4°C	14 days
Methane	2 x 40 mL VOA vials with Teflon® septum(2)	1 x 40 mL VOA vial	Cool to 4°C; protect from light; may be preserved with HCl to pH < 2	7 days if unpreserved 14 days if preserved
Phosphorus	Use an aliquot from the alkalinity bottle	100 mL	Cool to 4°C	28 days
Sulfate	Use an aliquot from the alkalinity bottle	100 mL	Cool to 4°C	28 days
Ammonia-N	1 x 1000 mL high-density polyethylene bottle(3)	100 mL	Cool to 4°C, add H_2SO_4 to pH <2	28 days
Nitrate-N	1 x 250 mL high-density polyethylene bottle(3)	100 mL	Cool to 4°C, add H_2SO_4 to pH <2	28 days
Temperature, Eh, pH, Specific Conductivity, Dissolved Oxygen, Ferrous Iron, Turbidity, field alkalinity, field CO_2	--	--	--	Immediately after sample collected
TSS	250 ml G/P	250 ml	Cool to 4°C	7 days
TDS	250 ml G/P	250 ml	Cool to 4°C	7 days
Total organic carbon	500-mL high-density polyethylene bottle or glass bottle	30 g	Cool to 4°C	28 days
Moisture content	Use an aliquot from the organic matter bottle	50 g	Cool to 4°C	None specified

(1) Starting from time of sample collection.
(2) Collect three extra containers for MS/MSD samples.
(3) Collect one extra container for sample spike and duplicate analyses.
(4) Collect two extra containers for MS/MSD samples.

Table 3
Natural Attenuation and Remedial Design Analytical Methods

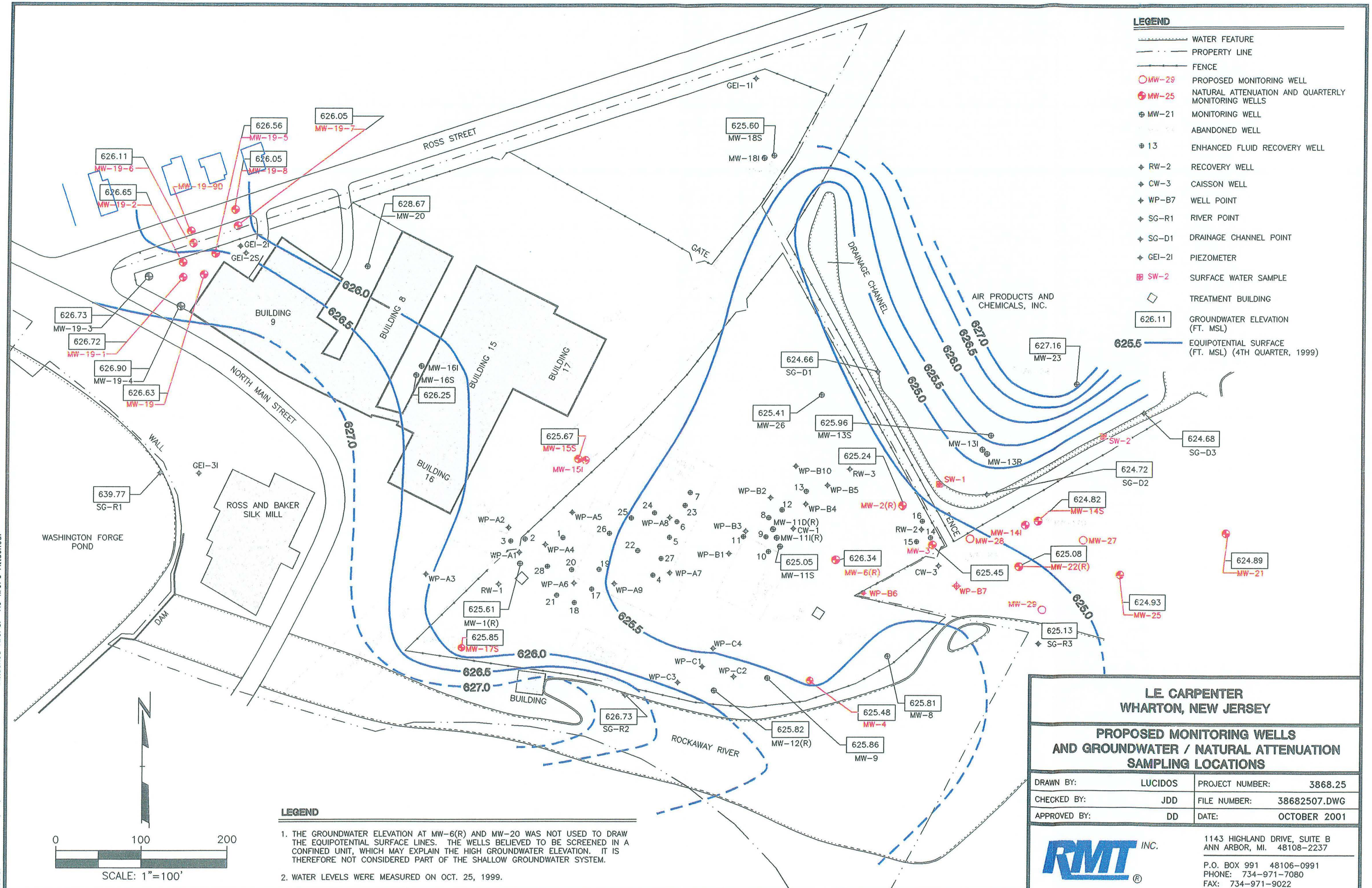
FIELD PARAMETERS	METHOD/EQUIPMENT	FREQUENCY
Dissolved oxygen	360.1[2]/Probe	Quarterly
Redox potential (Eh)	[4]Redox electrode	Quarterly
pH	150.1[2]/pH electrode	Quarterly
Ferrous iron	Hach kit	Quarterly
Temperature	From conductivity probe	Quarterly
Turbidity	Turbidimeter	Quarterly
Specific conductance	120.1[2]/Electrical conductivity meter	Quarterly
CO_2	Hach kit	Quarterly
Alkalinity (total)	Hach kit/4500-CO_2-D	Quarterly
Depth to water	Electric tape	Quarterly
LABORATORY PARAMETERS	**METHOD**	**FREQUENCY**
Benzene	602[1]	Quarterly
Toluene	602[1]	Quarterly
Ethylbenzene	602[1]	Quarterly
Xylenes	602[1]	Quarterly
DEHP	625[1]	Quarterly
Ammonia	350.3[2]	Quarterly
Nitrate	353.2[2]	Quarterly
Ferrous iron	Hach kit	Quarterly
Sulfate	375.4[2]/300.0	Quarterly
Heterotrophic bacteria plate count	9215B[4]	Quarterly
Methane	3810[3] SOP	Quarterly
TSS	160.2	Quarterly
TDS	160.1	Quarterly
Phosphorus	365.2[2]	Quarterly
Total organic carbon (soil)	9060[3]	During well installation

Notes:
(1) Federal Register 40 CFR Part 136, Vol. 49, No. 209, Test Parameters for the Analysis of Pollutants.
(2) USEPA 600/4-79-020 Methods for Chemical Analysis of Water and Waste.
(3) SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, U.S. EPA, 3rd Edition, 1986.
(4) Standard Methods for the Examination of Water and Wastewater, 19th Edition, 1995.

Table 4
Natural Attenuation and Remedial Design Analytical Reporting Limits

Analyte	Reporting Limit
Alkalinity	5 mg/L
Ammonia nitrogen	0.10
Iron (II)	0.1 mg/L
Nitrate nitrogen	0.1 mg/L
Phosphorus	0.03 mg/L
Sulfate	5 mg/L
TOC (soil)	100 mg/kg
Methane	5 µg/L
Carbon Dioxide	5 ppm
Benzene	0.25 µg/L
Toluene	0.25 µg/L
Ethylbenzene	0.25 µg/L
Xylenes (total)	0.25 µg/L
DEHP	0.5 µg/L

RMT COMPUTER AIDED DESIGN AND DRAFTING



LEGEND

1. THE GROUNDWATER ELEVATION AT MW-6(R) AND MW-20 WAS NOT USED TO DRAW THE EQUIPOTENTIAL SURFACE LINES. THE WELLS BELIEVED TO BE SCREENED IN A CONFINED UNIT, WHICH MAY EXPLAIN THE HIGH GROUNDWATER ELEVATION. IT IS THEREFORE NOT CONSIDERED PART OF THE SHALLOW GROUNDWATER SYSTEM.
2. WATER LEVELS WERE MEASURED ON OCT. 25, 1999.

L.E. CARPENTER
WHARTON, NEW JERSEY

PROPOSED MONITORING WELLS AND GROUNDWATER / NATURAL ATTENUATION SAMPLING LOCATIONS

DRAWN BY:	LUCIDOS	PROJECT NUMBER:	3868.25
CHECKED BY:	JDD	FILE NUMBER:	38682507.DWG
APPROVED BY:	DD	DATE:	OCTOBER 2001

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FIGURE 2

Drawing Name: J:\03868\25\38682507.dwg
Operator Name: lucidos
Scale: 1"=1'
Plot Date: Friday, October 12, 2001
Plot Time: 09:17.3624 AM
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